

APPENDIX E

Draft Interpretation of Benthic Macroinvertebrate Data

**The Lower Boise River
from Lucky Peak Dam to the
Confluence with the Snake River**

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PDS 6/6/98

Introduction

This document provides a brief summary of conclusions that stem from the interpretation of benthic macroinvertebrate data collected in the Boise River by the US Geological Survey (USGS). Bill Mullins of the USGS and staff members at the Idaho Division of Environmental Quality (DEQ) provided valuable assistance with interpretation. The draft guidance document published by Aquatic Biology Associates, Inc., of Corvallis, Oregon, contains many concepts that are important for the interpretive process. The conclusions that follow evaluate the health of the benthic community, and relate the condition of that community to water quality and habitat conditions in the lower Boise River.

Data Sources

- US Geological Survey, Boise Idaho, collection at five sites in October, 1995 and October, 1996.
- Todd V. Royer and G. Wayne Minshall, Idaho River Index (IRI)
- Aquatic Biology Associates - identification and quantification of all USGS samples

Interpretation Sources

DEQ

- Bill Clark
- Bryan Horsburgh
- Bob Steed
- Erica Anderson

Other Sources of Interpretation Guidance

- Bill Mullins - USGS, Boise
- Aquatic Biology Associates, Corvallis, Oregon

Summary of Conclusions

General Conclusions

- The lower Boise River is sub-optimal in terms of habitat and temperature, as indicated by the structure of the benthic communities sampled in 1995 and 1996.
- Habitat and temperature probably become more strongly limiting to the benthos at Middleton and Caldwell
- Benthic data at the mouth of the river does not consistently indicate conditions that are more or less degraded than at the Middleton and Caldwell sites.
- The very limited plecoptera populations probably point to fine sediment and warm summer water temperatures as limiting factors in the Boise, especially near Middleton and Parma
- The limited number of EPT taxa at all five sites, along with indicator organisms that increase or decline from upstream to downstream show that conditions are degraded (Table One, Selected Indicator Macroinvertebrates, page 1 & 2)

Indicators of Degraded Habitat Conditions

- Naididae, worms tolerant of fine sediment, increase dramatically to 17% of the total population at Caldwell in 1996, and are somewhat elevated as a percent of the total population (7.3%) at Glenwood Bridge in 1995.
- Plecoptera, organisms intolerant of fine sediment and warm temperatures, are few or zero at Middleton, Caldwell, and the mouth of the River (Chart 1)
- Predators are lower in a given year at Middleton, Caldwell, and the mouth than upstream (Table Two, pages 1 and 2)
- The numbers of tolerant taxa are greater at Middleton, Caldwell, and the mouth than upstream (Table Two, pages 1 and 2)
- Tricorythodes minutus and tolerant midges increase as percents of the total population at Middleton and Caldwell (Chart 2)
- Baetis Tricaudatus, an Ephemeroptera, declines near Middleton and Caldwell (Chart 3)

Annual Change Between 1995 and 1996 at the Five Lower Boise River Sites

DEQ is not certain whether changes from 1995 to 1996 can be considered significant in terms of habitat or water quality. The 1996 data are primarily a source of confirmation for the general conclusions indicated by the 1995 data. The benthic community in the lower Boise River is probably lower than the ABA "optimal" stream in part due to its nature as a large Snake River Plain river, and in part due to poor quality habitat. Like the 1995 data, the 1996 data seem to show again that Middleton and Caldwell are particular problem areas where habitat and temperature for benthos are probably even less favorable than at Eckert Road and Glenwood Bridge.

Table One

Comparison of Selected Indicator Macroinvertebrates in the Lower Boise River

All data collected by the USGS and analyzed by ABA in Corvallis

Tricorynoides minutus Tolerant					
Percent of Total Population					
		Glenwood	Caldwell	Glenwood	Middleton
		Barber	Fort Boise	Barber	Caldwell
		1995	18	0.17	21.67
		1996	2.7	0.04	10.13
					42.09
Total Plecoptera Intolerant - need gravel and cold water					
Percent of Total Population					
		Glenwood	Caldwell	Glenwood	Middleton
		Barber	Fort Boise	Barber	Caldwell
		1995	16	0.05	0.06
		1996	13.3	0.22	1.99
					0
					0
Total Chironomidae Tolerant Midges					
Percent of Total Population					
		Glenwood	Caldwell	Glenwood	Middleton
		Barber	Fort Boise	Barber	Caldwell
		1995	544.8	5.12	8.14
		1996	298.7	4.91	7.89
					9.62
					26.98
					12.08
					42.34
					25.37

Table One

Cheumatopsyche - caddisfly		Cheumatopsyche - caddisfly									
Mean Number of Individuals		Percent of Total Population									
		Barber Park	Glenwood	Middleton	Caldwell	Fort Boise	Barber	Glenwood	Middleton	Caldwell	Fort Boise
1995	327.6	394.9	712.4	82	34		1995	3.08	2.69	5.69	0.68
1996	90.7	157.3	87.3	0	16		1996	1.49	3.66	2.28	0
Baetis Tricaudatus		Baetis Tricaudatus						Moderately Tolerant			
Mean Number of Individuals		Percent of Total Population									
		Barber Park	Glenwood	Middleton	Caldwell	Fort Boise	Barber	Glenwood	Middleton	Caldwell	Fort Boise
1995	2152.8	2584.4	787.1	158	1518.7		1995	20.23	17.63	6.28	1.31
1996	1178.7	261.3	221.3	6.7	178.7		1996	19.37	6.09	5.78	0.44

**Average Number of Total Plecoptera,
Stoneflies that Represent Streams with Clean Gravel
1.99% and Good Water Quality**

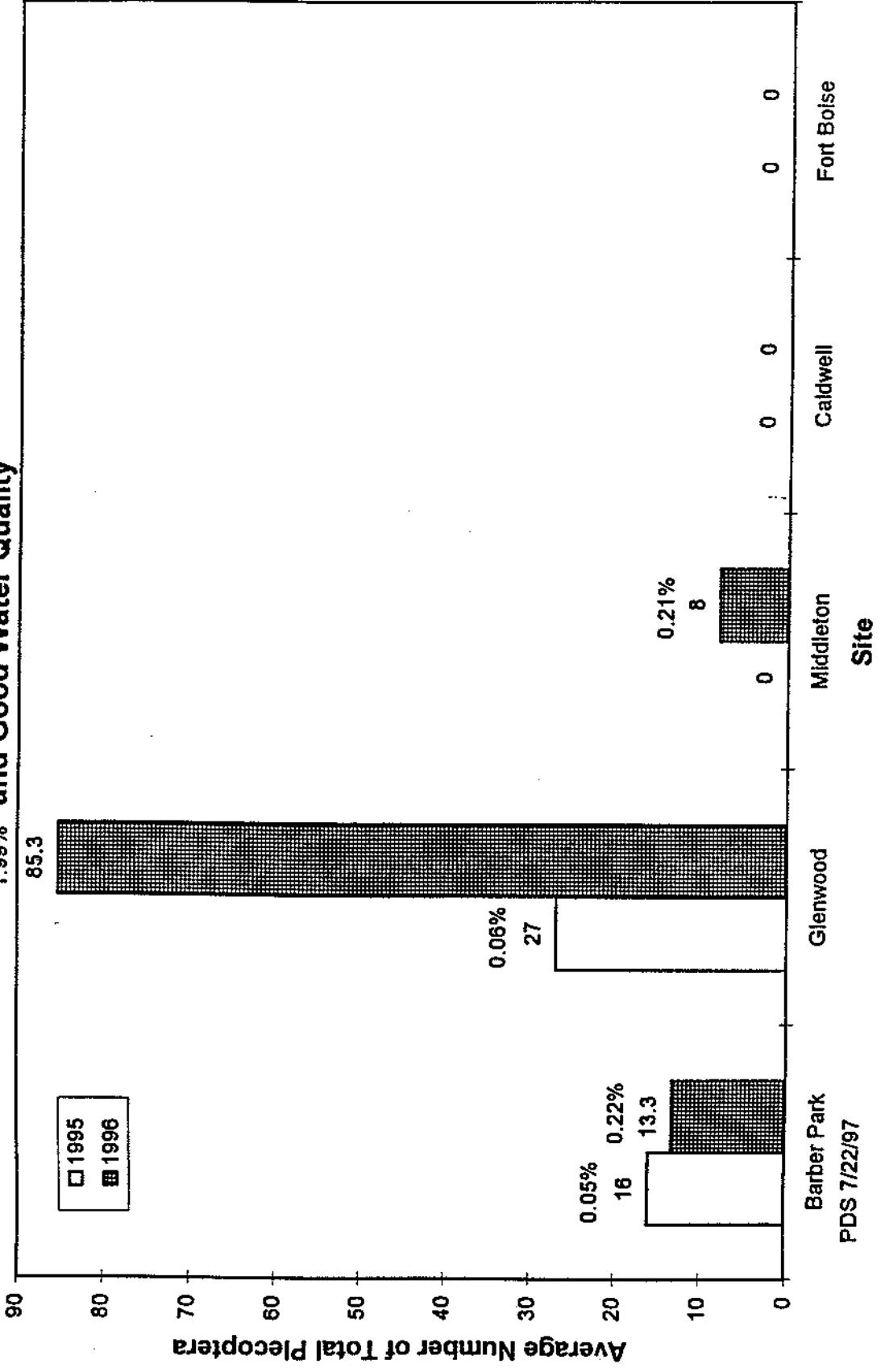


Table Two

Comparison of Indicator Parameters, Change from 1995 to 1996, by Site

All data collected by the USGS in the first week of October of 1995 and the fourth week of October of 1996						
PDS	6/6/98					
Eckert Road / Barber Park				Glenwood Bridge		
Parameter	1995	1996	Change	Parameter	1995	1996
Taxa	30	22	-8	Taxa	33	23
EPT Taxa	12	12	0	EPT Taxa	12	10
HBI	4.67	4.71	0.04	HBI	5.02	4.28
Predator	1.26	0.22	-1.04	Predator	1.92	4.04
Parasite	2.37	0.35	-2.02	Parasite	2.35	1.24
Collector-Gath	25.3	23.98	-1.32	Collector-Gath	37.94	11.29
Collector-Filt	63.21	69.02	5.81	Collector-Filt	48.7	73.97
Macrophyte-Herb	0	0	0	Macrophyte-Herb	0	0
Piercer-Herb	0	0.57	0.57	Piercer-Herb	0	0
Scraper	5.27	4.39	-0.88	Scraper	6.8	6.9
Shredder	0	0	0	Shredder	0	0
Xylophage	0	0	0	Xylophage	0	0
Omnivore	1.31	0.53	-0.78	Omnivore	0.65	0.19
Tolerant Taxa	3	3	0	Tolerant Taxa	5	2
Tolerant%	3.33	2.1	-1.23	Tolerant%	5.08	3.72
Total Abundance	10641.7	6085.5	-4556.2	Total Abundance	14663	4293.4
						-10369.6
Middleton				Caldwell		
Parameter	1995	1996	Change	Parameter	1995	1996
Taxa	38	39	1	Taxa	30	43
EPT Taxa	13	14	1	EPT Taxa	6	6
HBI	4.5	4.58	0.08	HBI	5.01	5.91
Predator	2.46	1.81	-0.65	Predator	4.52	1.06
Parasite	5.02	1.36	-3.66	Parasite	4.32	0.91
Collector-Gath	50.88	21.5	-29.38	Collector-Gath	37.69	56.83
Collector-Filt	36.48	68.03	31.55	Collector-Filt	49.38	28.65
Macrophyte-Herb	0	0	0	Macrophyte-Herb	0	0
Piercer-Herb	0.11	0.03	-0.08	Piercer-Herb	0	0
Scraper	1.84	0.86	-0.98	Scraper	0.6	5.15
Shredder	0	0	0	Shredder	0	0
Xylophage	0	0	0	Xylophage	0	0
Omnivore	1.03	3.46	2.43	Omnivore	0.71	2.5
Tolerant Taxa	10	12	2	Tolerant Taxa	7	9
Tolerant%	29.63	7.68	-21.95	Tolerant%	11.38	7.53
Total Abundance	12528.8	3827	-8701.8	Total Abundance	12037.1	1513.2
						-10523.9

Table Two

Mouth	1995	1996	Change
Taxa	28	35	7
EPT Taxa	7	9	2
HBI	4.58	4.82	0.24
Predator	0.5	0.24	-0.26
Parasite	1.36	0.62	-0.74
Collector-Gath	69.87	48.87	-21
Collector-Filt	19.17	41.63	22.46
Macrophyte-Herb	0	0	0
Piercer-Herb	0	0	0
Scraper	7.55	2.22	-5.33
Shredder	0	0	0
Xylophage	0	0	0
Omnivore	0.38	2.8	2.42
Tolerant Taxa	7	6	-1
Tolerant%	48.94	21.37	-27.57
Total Abundance	17864.8	5528.3	-12336.5

**Average Number of *Tricorythodes minutus* Individuals,
A Pollution Tolerant Organism**

42.1%
7519.2
□ 1995

■ 1996

Average Number of Individuals

8000

7000

6000

5000

4000

3000

2000

1000

0

21.7%
2714.4
□

10.1%
1219.3
□

19.1%
1056
■

27.8
1.8%
132.7
3.5%
 Middleton
Caldwell
Fort Boise
Site
PDS 7/22/97